

TECMO THUNDER DRAGON™

Service Instruction Manual

TECMO

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Before You Begin !!!

'STOP'

Read this entire manual before beginning work on this new video conversion! We have carefully included EVERYTHING needed to make this kit more than just a conversion! When finished, this kit should look, play and earn like a brand new, dedicated, video game. We have prepared a FIRST-CLASS complete kit. First things first. Using the KIT CONTENTS page of this manual, inventory

ALL the parts. Make sure you have them all! Next, carefully read all the various sections of this manual because it is filled with very IMPORTANT information. We want this new game to earn money for you as much as you do! So please, read through all the sections and proceed **ONLY** after you fully understand them all.

Kit Contents

- 2 — 8 Way Joysticks
 - 1 — THUNDER DRAGON™ Printed Circuit Board
 - 1 — THUNDER DRAGON™ Marquee Plex
 - 1 — Control Panel Overlay
 - 2 — Side Decals
 - 1 — Wiring Harness
 - 6 — Micro Switch Buttons
 - 1 — THUNDER DRAGON™ Monitor Card
 - 2 — "Shoot" stickers
 - 2 — "Bomb" stickers
 - 1 — "Side I" sticker
 - 1 — "Side II" sticker
 - 1 — Point of Purchase Card "New Game"
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Warning

You must use an isolation transformer for your monitor! Without one you may cause a power surge to the PC Board and do irreparable damage!!! All control circuits are composed of IC's, and though they have a long service life, they may be instantly broken in the event of mishandling. So, fully observe the following precautions:

1. Be sure to turn power "OFF" when changing parts or pulling/inserting each connector.
2. Don't use the tester to inspect the PC board, since an IC may be broken due to the tester's internal voltage.
3. Be sure never to expose the PC board to direct rays of the sun for an extended period of time.
4. When moving the PC board, use a PVC air mat, bubble wrap, etc. (static resistant materials only), so that the board does not receive a strong shock.

* Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should be plugged into only a grounded 3-wire outlet. If you have a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electrical shock if the control panel is not properly grounded! After servicing any parts on the panel, check that the grounding clip is firmly secured to the metal tab on the inside of the control panel. Only then should you lock up the game.

Also, this game's PC Board contains various custom chips. This was done to protect the operator and manufacturer from copy boards. For this reason we ask that you contact us for all logic repairs. If you feel you can repair the problem and do, or try, you may disqualify yourselves from our warrantee. If you should still prefer to do the repairs please feel free to contact us for any assistance we may be able to offer.

Notice

Parts salvaged from your old game are required to complete your kit. These salvaged parts MUST operate perfectly, or the converted game cannot perform properly or safely. Always repair circuitboard malfunctions and cabinet damage before conversion is attempted.

Power Requirements

The TECMO printed circuit board included in this kit requires +5 voltage and +12 voltage. The +5 voltage should be exactly 5V for this P.C.B. 5.2V is OK, but use no higher than this and not lower than 5.0V. +12V should be rated at 1 amp.

Monitor Requirements

This TECMO printed circuit board requires interfacing with NEG(-) composite sync. Most monitors have provisions for composite sync. Some monitors require that the vertical and horizontal negative sync be tied together in order to achieve a composite signal. For best results consult the monitor manufacturer.

NOTE: THUNDER DRAGON™ uses a vertical monitor, and be sure that an isolation transformer is used! Irreparable damage may occur to the board if this is omitted.

Service Information

TECMO, INC. guarantees this product to be free of defects for a period of 30 days after purchase. TECMO will repair or replace this product upon our inspection. Proof-of-Purchase may also be required. If you have any questions, please call our Service Dept. at (213) 329-5880, or write to: TECMO, Inc., 18005 South Adria Maru Lane, Carson, CA 90746

Description of Game

A one or two player, interactive space fighting game. 4 different weapon styles to choose from. Nuclear Bombs! Quicker action and controls. Buy-in feature and soooooo many levels that even we don't know how many there are!

How to Play

While controlling and defending your ship pick up "Power-up" items. These will give you various styled attack weapons to help you defeat your enemies. These "Power-up's" can increase in strength up to 8 times. Just keep collecting them, or get a "Super Power" which will automatically maximize your strength!!!

Cabinet Preparation

Cabinet

Inspect your old cabinet for any gouges or objects stuck on the extremity such as chewing gum. Remove all foreign objects and fill in the gouges with any type of quick-hardening wood putty. Sand to make sure the surface is smooth and wipe clean the outside of the old cabinet.

If the decal of this kit does not cover all of the old games graphics, we recommend repainting the outside of your cabinet with an acrylic based semi-gloss paint. This can be applied by either paint brush, roller or spray can. In games that have woodgrain sides, please remove old decals and clean the surface so there is no glue residue remaining on the cabinet.

To apply your new side graphics take a straight edge and make a top guideline roughly where the old graphic started on your game. Lightly moisten the cabinet with spray window cleaner and begin to apply the decal starting at the top working your way to the bottom. After the decal is in place, use a piece of the foam strip that comes in the packing as a squeegee and smooth the sticker down on the surface to remove excess moisture. Please allow 12 hours for your sticker to become permanently adhered to the sides before use.

Marquee Plex

Enclosed in this kit you will find one universal size Marquee plex. This should be ideal for the cabinet you are converting. Using the old marquee from the pervious game, lay it on top of the new one. Be sure that none of the title "THUNDER DRAGON™" is excluded before marking it to the proper size. Once this is done, proceed to cut it. Unless you have the equipment to cut the plexiglass safely, we recommend taking it to a local plastics supply to do the job. They usually charge no more than a couple of dollars, and you can insure it will be done right and without breakage. After the plexi is cut, install it!

Now is also a good time to inspect the lighting system. If the bulb(s) is old, replace it! This will insure a 'shining' and bright advertisement to lure paying customers to your newest game.

**** Control Panel***

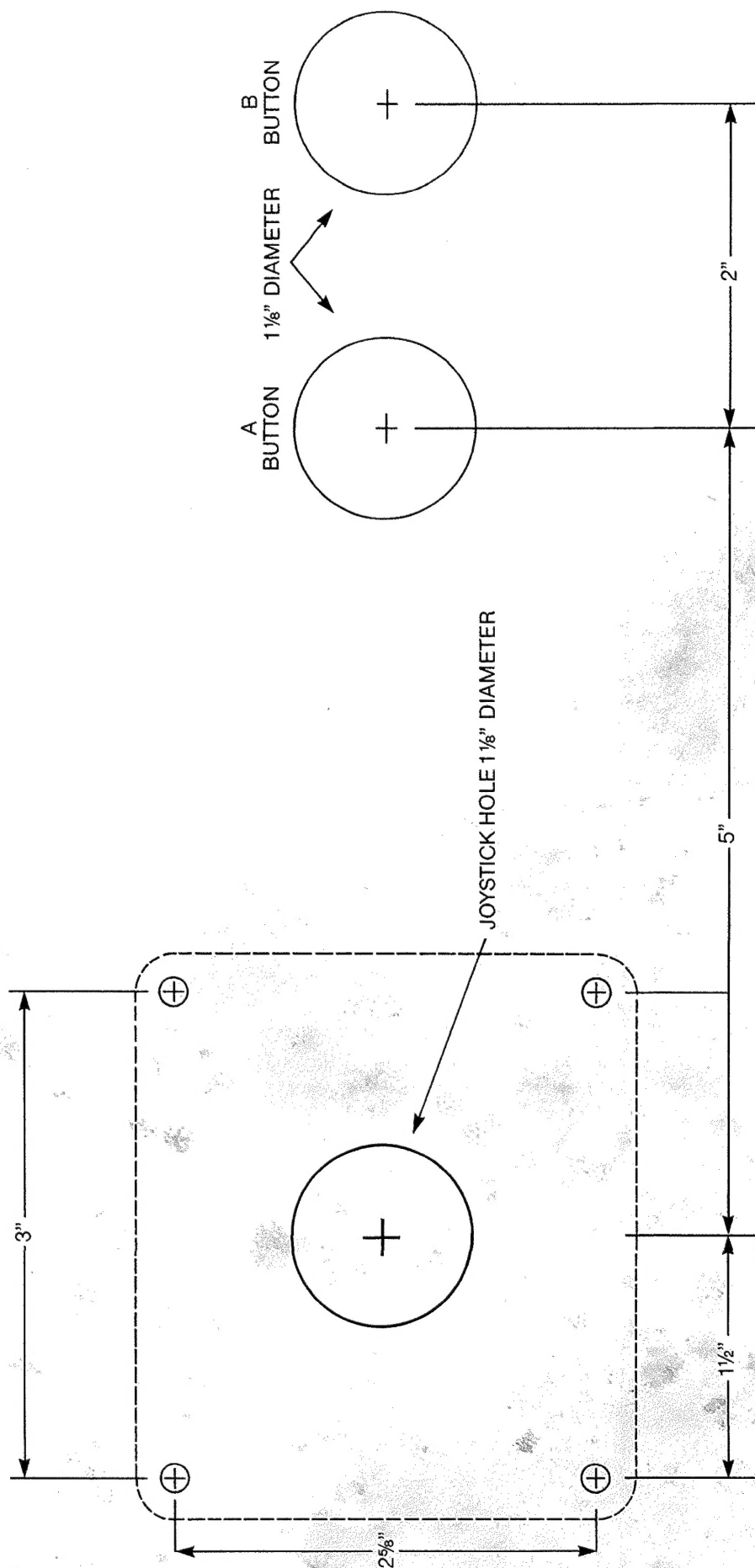
From the control panel previously removed, take off the old buttons, switches, joysticks, and wiring. Strip off the older lexan overlay and any vinyl button stickers. Using sandpaper, prepare the control panel surface until all remains of the previous material are gone. Lacquer thinner may be necessary if glue is still present.

Use the CONTROL PANEL TEMPLATE included in this kit to determine the placement of the necessary JOYSTICKS and push buttons on the control panel. Use the same template for both the 1 player and 2 player controls. Leave your existing 1 or 2 player start button holes where they are. Mark the necessary holes, then drill as needed. We suggest plugging any hole that is no longer needed with wood blocks, putty, etc. Remove the backing from the rear and carefully place the control panel overlay over the control panel, being careful not to get any air bubbles in the vinyl when it's applied.

After the control panel is securely on, with an exacto knife or razor blade carefully cut out holes on the control panel. Next install the button stickers on the control panel in their proper locations. Replace the buttons on the control panel and tighten them down. Return the control panel to the game for the next step in the kit process.

Control Panel Template

The following dimensions are for metal control panels; For wood control panels drill a $\frac{1}{8}$ " hole completely through, then drill a $\frac{1}{16}$ " hole completely through, being careful not to splinter the wood.



THIS IS ONLY AN APPROXIMATION.
USE YOUR OWN DISCRETION CONSIDERING FEASIBILITY AND COMFORT.

Wiring Procedures

Wiring Procedure (Universal Cabinet)

Disconnect the old wiring harness from the CPU board. Using the schematic drawings from your old game, carefully note the function of each wire. Label the wires if this helps.

Carefully remove all circuitboards and the metal circuitboard panel from the game. Leave the transformer chassis and the power supply braid in the game.

To wire your THUNDER DRAGON™ kit into a Universal upright cabinet, the following steps are suggested:

Leaving several inches of wire from the old wiring harness at each connector, cut the wires near the game's coin door, monitor, player panel, power supply, and speaker. **DON'T** cut the other side of these same wires (that is, at the CPU-board end).

Following the "Edge Connector" schematic drawings for your kit located in this manual, solder the coin door, monitor, control panel, power supply and speaker wires to the new CPU-board harness. Using electrical tape, be sure to insulate all splices.

Wiring To Power Supply

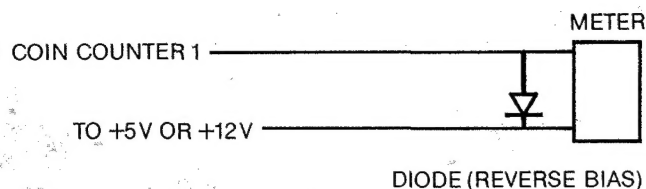
As mentioned in the section POWER REQUIREMENTS, this game uses +5V and +12V DC. Chances are the cabinet you are converting has a properly working power supply that is able to supply these voltages. If not, it is a good idea to install a new, inexpensive 'switching' power supply available from your local distributor. Locate the +5V leads, color coded RED, and install them to the proper position on the power supply. Next, locate the +12V leads, and install them to the proper position on the power supply as well. Last, position a BLACK ground wire from the harness and connect it. The game is now wired for power.

Ground System

It is highly recommended that a parallel GROUND wire be installed that is connected to every electronic chassis from earth ground to PCB to, power supply to, coin door to, control panel to, etc.

Notice

If you wish to use a coin meter for your THUNDER DRAGON™ kit, you may use a +5V or +12V coin meter. See the coin control wiring diagram for suggested wiring below.



Setting the Dip Switches

Now is a good time to set the THUNDER DRAGON™ dip switches. Refer to the "Dip Switch Settings" included in this manual and adjust the game as desired. The PCB is now ready to install into the cabinet.

NOTE: If you have a FCC cage to install, you may wish to adjust the sound level. This can be accomplished by turning the VR located on the top board either clockwise or counter-clockwise.

F.C.C. Regulations

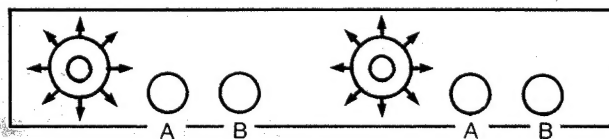
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the F.C.C. Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE: Any changes or modifications made by the user, to an intentional or non-intentional radiator, not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Thank you for your purchase of a TECMO Inc. THUNDER DRAGON™ kit.

Edge Connector

SOLDER SIZE	NO.	NO.	PARTS SIDE
GND	A	1	GND
GND	B	2	GND
+5V	C	3	+5V
+5V	D	4	+5V
	E	5	
+12V	F	6	+12V
	H	7	
COIN COUNTER 2	J	8	COIN COUNTER 1
COIN L. OUT 2	K	9	COIN L. OUT 1
SPEAKER (-)	L	10	SPEAKER (+)
	M	11	
VIDEO GREEN	N	12	VIDEO RED
VIDEO SYNC	P	13	VIDEO BLUE
SERVICE SW	R	14	VIDEO GND
RESET SW	S	15	TEST SW
COIN SW 2	T	16	COIN SW 1
SIDE II START	U	17	SIDE I START
2P UP	V	18	1P UP
2P DOWN	W	19	1P DOWN
2P LEFT	X	20	1P LEFT
2P RIGHT	Y	21	1P RIGHT
2P SHOOT	Z	22	1P SHOOT
2P SOL BOMB	a	23	1P SOL BOMB
	b	24	
	c	25	
	d	26	
GND	e	27	GND
GND	f	28	GND



Dip Switch Settings

- ***Dip Switch 1***

DIP SWITCH 1		1	2	3	4	5	6	7	8
NO. OF STOCK	3	OFF	OFF						
	2	ON	OFF						
	4	OFF	ON						
	1	ON	ON						
DIFFICULTY LEVEL	EASY					OFF	OFF		
	MEDIUM					ON	OFF		
	HARD					OFF	ON		
	VERY HARD					ON	ON		
MONITOR FLIP	NORMAL								OFF
	REVERSE								ON

• **Dip Switch 2**

DIP SWITCH 2		1	2	3	4	5	6	7	8
COIN SWITCH 1	1 COIN 1 CREDIT	OFF	OFF	OFF					
	1 COIN 2 CREDIT	ON	OFF	OFF					
	1 COIN 3 CREDIT	OFF	ON	OFF					
	1 COIN 4 CREDIT	ON	ON	OFF					
	2 COIN 1 CREDIT	OFF	OFF	ON					
	3 COIN 1 CREDIT	ON	OFF	ON					
	4 COIN 1 CREDIT	OFF	ON	ON					
	FREE PLAY	ON	ON	ON					
COIN SWITCH 2	1 COIN 1 CREDIT				OFF	OFF	OFF		
	1 COIN 2 CREDIT				ON	OFF	OFF		
	1 COIN 3 CREDIT				OFF	ON	OFF		
	1 COIN 4 CREDIT				ON	ON	OFF		
	2 COIN 1 CREDIT				OFF	OFF	ON		
	3 COIN 1 CREDIT				ON	OFF	ON		
	4 COIN 1 CREDIT				OFF	ON	ON		
	FREE PLAY				ON	ON	ON		
SOUND	ON							OFF	
	OFF							ON	

To all distributors.

Regarding Thunder Dragon dip switch settings.

Please note that the dip switch settings in the manual are incorrect.

Please use the settings on this page when ever needed.

We're sorry for any inconvenience this may bring and request any questions be directed to our service department manager.

Again, please accept our sincerest appologies.

Thunder Dragon Dip Sw. Settings

DIP SW 2		1	2	3	4	5	6	7	8
COIN SW 1	1 COIN 1 CREDIT	OFF	OFF	OFF					
	2 COIN 1 CREDIT	ON	OFF	OFF					
	3 COIN 1 CREDIT	OFF	ON	OFF					
	4 COIN 1 CREDIT	ON	ON	OFF					
	1 COIN 2 CREDIT	OFF	OFF	ON					
	1 COIN 3 CREDIT	ON	OFF	ON					
	1 COIN 4 CREDIT	OFF	ON	ON					
	FREE PLAY	ON	ON	ON					
COIN SW 2	1 COIN 1 CREDIT				OFF	OFF	OFF		
	2 COIN 1 CREDIT				ON	OFF	OFF		
	3 COIN 1 CREDIT				OFF	ON	OFF		
	4 COIN 1 CREDIT				ON	ON	OFF		
	1 COIN 2 CREDIT				OFF	OFF	ON		
	1 COIN 3 CREDIT				ON	OFF	ON		
	1 COIN 4 CREDIT				OFF	ON	ON		
	FREE PLAY				ON	ON	QN		
DEMO SOUND	YES							OFF	
	NO							ON	
DEFAULT SETTING		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

